

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2000-101220

(43)Date of publication of application : 07.04.2000

(51)Int.Cl.

H05K 3/32

H05K 13/04

(21)Application number : 10-268453

(71)Applicant : HITACHI LTD

(22)Date of filing : 22.09.1998

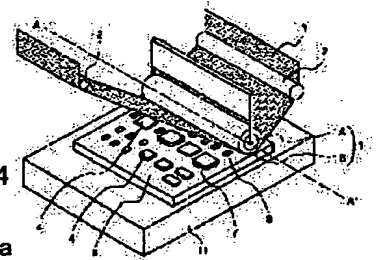
(72)Inventor : ASADA TOYOKI
FUJITA YUJI
UEDA KIE
AMANO YASUO
HACHIYA TOSHIHIRO

(54) METHOD AND SYSTEM FOR PACKAGING ELECTRONIC COMPONENTS

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a method and a system for packaging electronic components for which flip chip connection is performed by using an anisotropic conductive film for a circuit board.

SOLUTION: This method is provided with a soldering and packaging process for soldering and packaging electronic components such as a package component 7 and a chip component 8 onto a circuit board 6, anisotropic conductive film sticking process for pressing and sticking the anisotropic conductive film having a separator 4 at the desired position on the circuit board, a separator releasing process for releasing the separator of the stuck anisotropic conductive film by relatively moving a deformable or displaceable member 1 and the circuit board and transferring the separator onto an adhesive tape 3 while pressing the adhesive tape 3 with the member 1, and flip chip connecting and packaging for hardening the anisotropic conductive film and performing the flip chip connection and package of a semiconductor chip by pressing and heating the semiconductor chip on the anisotropic conductive film from which the separator 4 is released.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

*** NOTICES ***

JPO and NCIP are not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.**** shows the word which can not be translated.

3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] The soldering mounting process which carries out soldering mounting of the electronic parts, such as package components and a chip, on the circuit board, The anisotropy electric conduction film pasting process which pressurizes, sticks and makes the anisotropy electric conduction film which carries out separator ** the location of the request on the circuit board which soldered electronic parts at this soldering mounting process, The separator exfoliation process of imprinting the separator of the anisotropy electric conduction film which was made moving this member and said circuit board relatively, and was stuck at said anisotropy electric conduction film pasting process while pressing down adhesive tape by the member in which deformation or displacement is possible to said adhesive tape, and exfoliating, It is stuck at said anisotropy electric conduction film pasting process. By pressurizing and heating a semiconductor chip at said separator exfoliation process on the anisotropy electric conduction film with which the separator exfoliated The mounting approach of the electronic parts characterized by having the flip-chip-bonding mounting process which is made to harden an anisotropy electric conduction film and carries out flip-chip-bonding mounting of the semiconductor chip.

[Claim 2] The soldering mounting process which carries out soldering mounting of the electronic parts, such as package components and a chip, on the circuit board, The anisotropy electric conduction film pasting process which pressurizes, sticks and makes the anisotropy electric conduction film which carries out separator ** the location of the request on the circuit board which soldered electronic parts at this soldering mounting process, the electronic parts by which soldering mounting was carried out at said soldering mounting process, pressing down adhesive tape more than height mostly by the member in which deformation or displacement is possible The separator exfoliation process of imprinting the separator of the anisotropy electric conduction film which was made moving this member and said circuit board relatively, and was stuck at said anisotropy electric conduction film pasting process to said adhesive tape, and exfoliating, It is stuck at said anisotropy electric conduction film pasting process. By pressurizing and heating a semiconductor chip at said separator exfoliation process on the anisotropy electric conduction film with which the separator exfoliated The mounting approach of the electronic parts characterized by having the flip-chip-bonding mounting process which is made to harden an anisotropy electric conduction film and carries out flip-chip-bonding mounting of the semiconductor chip.

[Claim 3] The soldering mounting process which carries out soldering mounting of the electronic parts, such as package components and a chip, on the circuit board, The anisotropy electric conduction film pasting process which pressurizes, sticks and makes the anisotropy electric conduction film which carries out separator ** the location of the request on the circuit board which soldered electronic parts at this soldering mounting process, the electronic parts by which soldering mounting was carried out at said soldering mounting process, pressing down adhesive tape with a deformable elastic body roller more than height mostly The separator exfoliation process of imprinting the separator of the anisotropy electric conduction film which was made moving relatively this elastic body roller and said circuit board, and was stuck at said anisotropy electric conduction film pasting process to said adhesive tape, and exfoliating, It is stuck at said anisotropy electric conduction film pasting process. By pressurizing and heating a semiconductor chip at said separator exfoliation process on the anisotropy electric conduction

film with which the separator exfoliated The mounting approach of the electronic parts characterized by having the flip-chip-bonding mounting process which is made to harden an anisotropy electric conduction film and carries out flip-chip-bonding mounting of the semiconductor chip.

[Claim 4] The soldering mounting process which carries out soldering mounting of the electronic parts, such as package components and a chip, on the circuit board, The anisotropy electric conduction film pasting process which pressurizes, sticks and makes the anisotropy electric conduction film which carries out separator ** the location of the request on the circuit board which soldered electronic parts at this soldering mounting process, Pressing down adhesive tape with the elastic body roller of the electronic parts by which soldering mounting was carried out at said soldering mounting process which prepared the thick elastic body layer in the periphery of the hard roll heart more than height mostly The separator exfoliation process of imprinting the separator of the anisotropy electric conduction film which was made moving relatively this elastic body roller and said circuit board, and was stuck at said anisotropy electric conduction film pasting process to said adhesive tape, and exfoliating, It is stuck at said anisotropy electric conduction film pasting process. By pressurizing and heating a semiconductor chip at said separator exfoliation process on the anisotropy electric conduction film with which the separator exfoliated The mounting approach of the electronic parts characterized by having the flip-chip-bonding mounting process which is made to harden an anisotropy electric conduction film and carries out flip-chip-bonding mounting of the semiconductor chip.

[Claim 5] The soldering mounting means which carries out soldering mounting of the electronic parts, such as package components and a chip, on the circuit board, The anisotropy electric conduction film pasting means which pressurizes, sticks and makes the anisotropy electric conduction film which carries out separator ** the location of the request on the circuit board which soldered electronic parts with this soldering mounting means, A separator exfoliation means to imprint the separator of the anisotropy electric conduction film which was made to move this member and said circuit board relatively, and was stuck with said anisotropy electric conduction film pasting means while pressing down adhesive tape by the member in which deformation or displacement is possible to said adhesive tape, and to exfoliate, It is stuck with said anisotropy electric conduction film pasting means. By pressurizing and heating a semiconductor chip with said separator exfoliation means on the anisotropy electric conduction film with which the separator exfoliated The mounting system of the electronic parts characterized by having the flip-chip-bonding mounting means which is made to harden an anisotropy electric conduction film and carries out flip-chip-bonding mounting of the semiconductor chip.

[Translation done.]

*** NOTICES ***

JPO and NCIP are not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.**** shows the word which can not be translated.

3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the mounting approach of the electronic parts for manufacturing the mounting structure which mounted chips, such as package components, such as RAM, such as a DC-DC converter, a switch regulator, and SRAM, and ROM, resistance, and a capacitor, in high density around this semiconductor chip, and its system to the circuit board outside semiconductor chips, such as a microcomputer by which flip chip bonding is carried out using an anisotropy electric conduction film, CPU and ASIC (Application Specific Integrated Circuit: application specific integrated circuit), and a chip set.

[0002]

[Description of the Prior Art] Conventionally, the anisotropy electric conduction film is used for the flip-chip-bonding approach which connects a semiconductor chip to a glass substrate electrically by direct face down as a connection method of semiconductor chips, such as a liquid crystal display. Generally, first, this flip-chip-bonding approach carries out temporary sticking by pressure of the anisotropy electric conduction film beforehand in the location of a glass substrate in which a semiconductor chip is carried, carries, pressurizes and heats a semiconductor chip on said anisotropy electric conduction film, and connects a glass substrate to a semiconductor chip electrically. Thus, the anisotropy electric conduction film is protecting the adhesion side of an anisotropy electric conduction film by the interlaminar paper called a separator, and the process which removes said separator from an anisotropy electric conduction film is required at the time of connection of a semiconductor chip. There is an approach currently indicated by JP,06-243726,A as the example. Usually, since the glass substrate top of a liquid crystal display mounts only the semiconductor chip of the same size, the above-mentioned separator exfoliation equipment is the device in which the separator of the same size is removed mostly. Moreover, the mounting components on a glass substrate were only the semiconductor chips of the same size mostly, and were that in which neither a chip nor package components are mounted.

[0003]

[Problem(s) to be Solved by the Invention] On the other hand, in order to manufacture small products, such as a cellular phone, a personal computer, and a digital camera The microcomputer by which flip chip bonding is carried out to the circuit board using an anisotropy electric conduction film, CPU, ASIC (Application Specific Integrated Circuit: application specific integrated circuit), It will be necessary to manufacture the mounting structure which mounted chips, such as package components, such as RAM, such as a DC-DC converter, a switch regulator, and SRAM, and ROM, resistance, and a capacitor, in high density outside semiconductor chips, such as a chip set, around this semiconductor chip. Thus, outside the semiconductor chip by which flip chip bonding is carried out to the circuit board using an anisotropy electric conduction film, in case the mounting structure which mounted package components, resistance, and a chip in high density is manufactured, it is necessary to carry out soldering mounting of package components, the chip, etc. to the circuit board around this semiconductor chip first. However, in the conventional technique, it was not enough taken into consideration to what carried out soldering mounting of package components, the chip, etc. to the circuit board previously about the point which uses a semiconductor chip around the above-mentioned package components or a chip, uses an anisotropy electric conduction film for high density, and carries out flip-chip-bonding mounting.

[0004] The microcomputer by which flip chip bonding is carried out to the circuit board using an anisotropy electric conduction film that the object of this invention should solve the above-mentioned technical problem, Outside semiconductor chips, such as CPU, ASIC, and a chip set, around this semiconductor chip RAM, such as a DC-DC converter, a switch regulator, and SRAM, It is in offering the mounting approach of the electronic parts which enabled it to manufacture the mounting structure which mounted chips, such as package components, such as ROM, resistance, and a capacitor, in high density with sufficient productive efficiency, and its system.

[0005]

[Means for Solving the Problem] The soldering mounting process that this invention carries out soldering mounting of the electronic parts, such as package components and a chip, on the circuit board in order

to attain the above-mentioned object, The anisotropy electric conduction film pasting process which pressurizes, sticks and makes the anisotropy electric conduction film which carries out separator ** the location of the request on the circuit board which soldered electronic parts at this soldering mounting process, The separator exfoliation process of imprinting the separator of the anisotropy electric conduction film which was made moving this member and said circuit board relatively, and was stuck at said anisotropy electric conduction film pasting process while pressing down adhesive tape by the member in which deformation or displacement is possible to said adhesive tape, and exfoliating, It is stuck at said anisotropy electric conduction film pasting process. By pressurizing and heating a semiconductor chip at said separator exfoliation process on the anisotropy electric conduction film with which the separator exfoliated It is the mounting approach of the electronic parts characterized by having the flip-chip-bonding mounting process which is made to harden an anisotropy electric conduction film and carries out flip-chip-bonding mounting of the semiconductor chip. Moreover, the soldering mounting process that this invention carries out soldering mounting of the electronic parts, such as package components and a chip, on the circuit board, The anisotropy electric conduction film pasting process which pressurizes, sticks and makes the anisotropy electric conduction film which carries out separator ** the location of the request on the circuit board which soldered electronic parts at this soldering mounting process, the electronic parts by which soldering mounting was carried out at said soldering mounting process, pressing down adhesive tape more than height mostly by the member in which deformation or displacement is possible The separator exfoliation process of imprinting the separator of the anisotropy electric conduction film which was made moving this member and said circuit board relatively, and was stuck at said anisotropy electric conduction film pasting process to said adhesive tape, and exfoliating, It is stuck at said anisotropy electric conduction film pasting process. By pressurizing and heating a semiconductor chip at said separator exfoliation process on the anisotropy electric conduction film with which the separator exfoliated It is the mounting approach of the electronic parts characterized by having the flip-chip-bonding mounting process which is made to harden an anisotropy electric conduction film and carries out flip-chip-bonding mounting of the semiconductor chip. [0006] Moreover, the soldering mounting process that this invention carries out soldering mounting of the electronic parts, such as package components and a chip, on the circuit board, The anisotropy electric conduction film pasting process which pressurizes, sticks and makes the anisotropy electric conduction film which carries out separator ** the location of the request on the circuit board which soldered electronic parts at this soldering mounting process, the electronic parts by which soldering mounting was carried out at said soldering mounting process, pressing down adhesive tape with a deformable elastic body roller more than height mostly The separator exfoliation process of imprinting the separator of the anisotropy electric conduction film which was made moving relatively this elastic body roller and said circuit board, and was stuck at said anisotropy electric conduction film pasting process to said adhesive tape, and exfoliating, It is stuck at said anisotropy electric conduction film pasting process. By pressurizing and heating a semiconductor chip at said separator exfoliation process on the anisotropy electric conduction film with which the separator exfoliated It is the mounting approach of the electronic parts characterized by having the flip-chip-bonding mounting process which is made to harden an anisotropy electric conduction film and carries out flip-chip-bonding mounting of the semiconductor chip. Moreover, the soldering mounting process that this invention carries out soldering mounting of the electronic parts, such as package components and a chip, on the circuit board, The anisotropy electric conduction film pasting process which pressurizes, sticks and makes the anisotropy electric conduction film which carries out separator ** the location of the request on the circuit board which soldered electronic parts at this soldering mounting process, Pressing down adhesive tape with the elastic body roller of the electronic parts by which soldering mounting was carried out at said soldering mounting process which prepared the thick elastic body layer in the periphery of the hard roll heart more than height mostly The separator exfoliation process of imprinting the separator of the anisotropy electric conduction film which was made moving relatively this elastic body roller and said

circuit board, and was stuck at said anisotropy electric conduction film pasting process to said adhesive tape, and exfoliating. It is stuck at said anisotropy electric conduction film pasting process. By pressurizing and heating a semiconductor chip at said separator exfoliation process on the anisotropy electric conduction film with which the separator exfoliated It is the mounting approach of the electronic parts characterized by having the flip-chip-bonding mounting process which is made to harden an anisotropy electric conduction film and carries out flip-chip-bonding mounting of the semiconductor chip. [0007] Moreover, a soldering mounting means by which this invention carries out soldering mounting of the electronic parts, such as package components and a chip, on the circuit board, The anisotropy electric conduction film pasting means which pressurizes, sticks and makes the anisotropy electric conduction film which carries out separator ** the location of the request on the circuit board which soldered electronic parts with this soldering mounting means, A separator exfoliation means to imprint the separator of the anisotropy electric conduction film which was made to move this member and said circuit board relatively, and was stuck with said anisotropy electric conduction film pasting means while pressing down adhesive tape by the member in which deformation or displacement is possible to said adhesive tape, and to exfoliate, It is stuck with said anisotropy electric conduction film pasting means. By pressurizing and heating a semiconductor chip with said separator exfoliation means on the anisotropy electric conduction film with which the separator exfoliated It is the mounting system of the electronic parts characterized by having the flip-chip-bonding mounting means which is made to harden an anisotropy electric conduction film and carries out flip-chip-bonding mounting of the semiconductor chip.

[0008] The microcomputer by which flip chip bonding is carried out to the circuit board using an anisotropy electric conduction film according to said configuration as explained above, CPU, ASIC (Application Specific Integrated Circuit: application specific integrated circuit), Outside semiconductor chips, such as a chip set, around this semiconductor chip A DC-DC converter, The mounting structure which mounted chips, such as package components, such as RAM, such as a switch regulator and SRAM, and ROM, resistance, and a capacitor, in high density can be manufactured with sufficient productive efficiency. Consequently, small products, such as a cellular phone, a personal digital assistant, a personal computer, and a digital camera, can be manufactured cheaply.

[0009]

[Embodiment of the Invention] The gestalt of the operation of an approach which mounts electronic parts, such as a semiconductor chip concerning this invention, package components, and a chip, in the circuit board is explained using a drawing. This invention is carrying out soldering mounting of the package components 7 or the chip 8 on the circuit board 6, and carrying out high density assembly by carrying out flip chip bonding of the semiconductor chip 14, and mounting it directly on the circuit board 6, makes circuit board 6 size small, and realizes the miniaturization of products, such as a cellular phone, a personal computer, and a digital camera. Namely, in this invention, in order to realize a miniaturization in the case of products, such as a cellular phone, a personal computer, and a digital camera On the circuit board 6, a microcomputer, CPU, ASIC (Application Specific Integrated Circuit: application specific integrated circuit), It is necessary to manufacture the high-density-assembly structure which mounted the chips 8, such as the package components 7, such as RAM, such as a DC-DC converter, a switch regulator, and SRAM, and ROM, resistance, and a capacitor, around the semiconductor chip 14 outside the semiconductor chips 14, such as a chip set.

[0010] Next, how to carry out high density assembly of the semiconductor chip 14, the package components 7, and chip 8 grade for manufacturing such the high-density-assembly structure to the circuit board 6 is explained using drawing 3 A, drawing 3 B, and drawing 3 C. First, as step 1 shows to drawing 3 A, it is laid on stage 11a and solder 12 is supplied to the part (electrode) of the request on the circuit board 6 in which the terminal of the package components 7 or a chip 8 or a lead is mounted. As the supply approach of this solder 12, a solder printing method is used, for example. Next, as step 2 shows, the terminal of the package components 7 or a chip 8 or a lead is carried on the circuit board 6.

Next, as step 3 shows, the terminal of the package components 7 or a chip 8 or a lead is connected with circuit wiring formed in the circuit board 6 by applying heat by a reflow etc. to said circuit board 6, carrying out melting of the solder 12, and giving reflow soldering.

[0011] Next, flip chip bonding which mounts a semiconductor chip 14 on the circuit board 6 is performed. As explained above, in order to manufacture the high-density-assembly structure, the package components 7 and a chip 8 were carried out at the circuit board 6, and it was made to carry out flip-chip-bonding mounting of the semiconductor chip 14 at the circuit board 6 after connection mounting. Since the semiconductor chip 14 is temporarily carried on the circuit board 6 if it is going to carry out flip-chip-bonding mounting of the semiconductor chip 14 before carrying out connection mounting of the package components 7 or the chip 8 to the circuit board 6, solder 12 printing at the time of solder 12 supply is difficult, and it becomes difficult solder 12 to print especially to the circumference of a semiconductor chip 14, and the high density assembly made close around a semiconductor chip 14 becomes difficult. Then, as mentioned above, previously, connection mounting of the package components 7 or the chip 8 is carried out at the circuit board 6, and it was made to carry out flip-chip-bonding mounting of the semiconductor chip 14 after that at the circuit board 6.

[0012] Hereafter, the above-mentioned flip chip bonding is explained in full detail. First, previously, where connection mounting of the package components 7 or the chip 8 is carried out at the circuit board 6, as step 4 shows, the anisotropy electric conduction film 5 cut in the configuration which *****ed in the configuration of a semiconductor chip 14 is stuck at drawing 3 A on the circuit board 6 which mounts a semiconductor chip 14 using the bonding tool 13. Namely, the anisotropy electric conduction film 5 cut by the configuration which *****ed in the configuration of a semiconductor chip 14 is held to the bonding tool 13. Convey in the location of the request on the circuit board 6 which mounts the semiconductor chip 14 laid on the stage 11 in the bonding tool 13 holding this anisotropy electric conduction film 5, and it has and causes it. The anisotropy electric conduction film 5 will be stuck by pushing the anisotropy electric conduction film 5 against the location of the request on the circuit board 6. By the way, when sticking the anisotropy electric conduction film 5 on the anisotropy electric conduction film 5 of the part which mounts a semiconductor chip 14 on the circuit board 6 laid on stage 11a, in order to prevent adhesion with the anisotropy electric conduction film 5 and the bonding tool 13, it will have a separator 4. Next, where connection mounting is carried out, as steps 5, 6, and 7 show the package components 7 and a chip 8 to the circuit board 6 at drawing 3 B, on each anisotropy electric conduction film 5 with which the separator 4 was efficiently removed from on the anisotropy electric conduction film 5 stuck on the circuit board 6 at once, and these separators 4 were removed, flip chip bonding is used and a semiconductor chip 14 is carried. [two or more]

[0013] The perspective view of one example of the separator exfoliation equipment applied to this invention at drawing 1 is shown. Drawing 2 is an A-A' sectional view. drawing 1 and drawing 2 -- setting -- 1 -- an elastic body roller and 1A -- the roll heart and 1B -- an elastic body layer and 2 -- an auxiliary roller and 3 -- for an anisotropy electric conduction film and 6, the circuit board and 7 are [adhesive tape and 4 / a separator and 5 / a chip and 11b of package components and 8] stages. The structure of the separator exfoliation equipment applied to this invention using drawing 1 and drawing 2 is explained hereafter, and, subsequently the exfoliation approach of a separator 4 is explained using drawing 3 B. The separator exfoliation equipment concerning this invention has the long elastic body roller 1 and the auxiliary roller 2 of the long picture in the right and left, is equipped with adhesive tape 3 directly under the elastic body roller 1 and the auxiliary roller 2, and where connection mounting of the package components 7 or the chip 8 is carried out at the circuit board 6, it has the device which can press adhesive tape 3 against the circuit board 6 by dropping the long elastic body roller 1. The long elastic body roller 1 forms elastic body layer 1B in roll heart 1A at the periphery of the roll heart 1A using a hard ingredient. In the hard construction material of roll heart 1A of the elastic body roller 1, plastics, aluminum, and stainless steel are desirable. Moreover, to elastic body layer 1B formed in the periphery of roll heart 1A of the elastic body roller 1, cushioning materials, such as rubber and sponge,

are desirable. Moreover, it may not necessarily limit to hard construction material, but the construction material of an elastic body may be used for roll heart 1A of the elastic body roller 1. However, mounting connection of the package components 7 or the chip 8 is made previously at the circuit board 6. By the relation which removes a separator 4 from on two or more anisotropy electric conduction films 5 stuck around the package components 7 by approaching only by making it run the long elastic body roller 1 and the circuit board 6 laid in stage 11b relatively (migration) As shown in drawing 2 , the need of making it thicker than the height T2 of mounting components, such as the package components 7 and a chip 8, ($T1 > T2$) has the thickness T1 of an elastic body layer.

[0014] In addition, although the case where the elastic body roller 1 of the long picture which elastic body layer 1B may deform constituted was explained by the above explanation in order to remove a separator 4 from on two or more anisotropy electric conduction films 5 stuck around the package components 7 by approaching In addition, as shown in drawing 4 , the ball-like member 20 is arranged in in the shape of a single tier in a slot 22. The sheet metal-like member 21 which bends greatly to the these single-tiers-like ball member 20 is applied, and it becomes possible to use what was constituted so that the pressure grant means 23, such as a spring, and a gas or a liquid, might give a pressure to this sheet metal-like member 21. Namely, the height T2 of mounting components, such as the package components 7 and a chip 8, is imitated, and the ball-like member 20 just displaces greatly. Since mounting components mounted beforehand, such as the package components 7 and a chip 8, and the anisotropy electric conduction film 5 by which temporary sticking by pressure was carried out are close the circuit board 6 top and has loaded [the top] together as shown in drawing 1 , drawing 2 , and drawing 3 B, on the top face of the circuit board 6, the components difference of elevation of the height T2 of mounting components will have produced it.

[0015] When the elastic body roller 1 is pressed against the above-mentioned circuit board 6, as it is shown in drawing 2 , elastic body layer 1B of the elastic body roller 1 will imitate and deform the separator exfoliation equipment concerning this invention into the height T2 of mounting components, and elastic body layer 1B of the elastic body roller 1 will learn it on the circuit board 6. The adhesive tape 3 which it had directly under the elastic body roller 1 beforehand is that the elastic body roller 1 contacts circuit board 6 top face, and adhesive tape 3 will also contact the top face of the circuit board 6. Then, the adhesive tape 3 pressed against circuit board 6 top face with the elastic body roller 1 can also contact the anisotropy electric conduction film 5 thinner than the height T2 of mounting components, and can imprint the separator 4 which it has on the front face of the anisotropy electric conduction film 5 to adhesive tape 3. By the way, as shown in drawing 3 B, separator exfoliation equipment is equipped with the device 9 which can supply adhesive tape 3 in a reel configuration, and the device 10 which the adhesive tape 3 with which the separator 4 was imprinted further also collects in a reel configuration. Therefore, the adhesive tape 3 which adhesive tape 3 was supplied to the part in which the elastic body roller 1 is located via the auxiliary roller 2 from the feeder style 9, and imprinted the separator 4 in this part will be collected by the recovery device 10 via the auxiliary roller 2.

[0016] By the way, although doubling with the size of the circuit board 6 is desirable as for the width of face of adhesive tape 3, it is not necessary to necessarily double it with the size of the circuit board 6. In short, even if it makes width of face of adhesive tape 3 narrower than the size of the circuit board 6, with the elastic body roller 1, adhesive tape 3 aims at two or more anisotropy electric conduction films 5 top stuck on the circuit board 6, and should just be pressed against these two or more anisotropy electric conduction films 5. Next, the procedure of the exfoliation approach of the separator 4 concerning this invention is explained using drawing 3 B. The feeder style by which 9 was constituted from an adhesive tape supply reel etc., and 10 are the recovery devices which consisted of adhesive tape take up reels etc. First, the package components 7 and a chip 8 are mounted beforehand, the circuit board 6 by which temporary sticking by pressure of two or more anisotropy electric conduction films 5 which have a separator 4 on a front face further was carried out is laid on stage 11b, and is conveyed to the elastic body roller 1 down side, revolution actuation of the feeder style 9 and the

recovery device 10 is carried out, and adhesive tape 3 is sent out directly under the elastic body roller 1 and the auxiliary roller 2 (step 5).

[0017] Next, drop the elastic body roller 1, pressing down adhesive tape 3, and the leader of adhesive tape 3 and the circuit board 6 is contacted. Forcing the circuit board 6 by the fixed force, move stage 11b to the longitudinal direction of adhesive tape 3, and the circuit board 6 is moved to it (transit). It controls so that the passing speed of the adhesive tape in directly under [of the elastic body roller 1 by the feeder style 9 and the recovery device 10] turns into passing speed of the circuit board 6, and the same rate at migration and coincidence of the circuit board 6 (step 6). Consequently, when elastic body layer 1B of the long elastic body roller 1 imitates and deforms into the height T2 of the mounting components 7, 8, and 5, since the separator 4 of the anisotropy electric conduction film 5 in two or more [on the circuit board 6] has the adhesion of adhesive tape 3 larger than the adhesive strength of the anisotropy electric conduction film 5 which carried out temporary sticking by pressure, it will be removed from the anisotropy electric conduction film 5, and will be altogether imprinted by adhesive tape 3 (step 7). According to the separator exfoliation process (steps 5, 6, and 7) of having explained above The long elastic body roller 1 and long adhesive tape 3 which elastic body layer 1B imitates and deforms into the height T2 of the mounting components 7, 8, and 5 are used. By making it move relatively to the circuit board 6 by which the package components 7 and a chip 8 were mounted around the anisotropy electric conduction film 5 by being close (transit) By removing much exfoliations of the separator 4 of the anisotropy electric conduction film 5 which is one process of the flip chip bonding of a semiconductor chip 14 for a short time, separator exfoliation process time amount can be shortened substantially, and the productive efficiency of flip chip bonding can be raised.

[0018] Next, the circuit board 6 which has two or more anisotropy electric conduction films with which the separator 4 was removed is conveyed on stage 11c in the equipment carrying a semiconductor chip 14, as shown in drawing 3 C. Next, each semiconductor chip 14 is pressed from each anisotropy electric conduction film 5 with the bonding tool 13, each semiconductor chip 14 is pressurized and heated, the anisotropy electric conduction film 5 is stiffened, and connection mounting of the circuit board 6 and each semiconductor chip 14 is carried out (step 8). As explained above, the mounting structure which mounted the package components 7 and a chip 8 in high density can be efficiently manufactured to the circuit board 6 around the semiconductor chip 14 by which flip chip bonding is carried out using the anisotropy electric conduction film 5, and this semiconductor chip 14 (step 9).

[0019]

[Effect of the Invention] The microcomputer by which flip chip bonding is carried out to the circuit board using an anisotropy electric conduction film according to this invention, CPU, ASIC (Application Specific Integrated Circuit: application specific integrated circuit), Outside semiconductor chips, such as a chip set, around this semiconductor chip A DC-DC converter, The mounting structure which mounted chips, such as package components, such as RAM, such as a switch regulator and SRAM, and ROM, resistance, and a capacitor, in high density can be manufactured with sufficient productive efficiency. Consequently, the effectiveness that small products, such as a cellular phone, a personal digital assistant, a personal computer, and a digital camera, can be manufactured cheaply is done so.

[Translation done.]

*** NOTICES ***

JPO and NCIP are not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.*** shows the word which can not be translated.

3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the perspective view showing one example of the separator exfoliation equipment concerning this invention.

[Drawing 2] It is the A-A' view sectional view of drawing 1 .

[Drawing 3 A] It is process drawing showing the mounting process of the package components and chip which are the gestalt of 1 implementation of the mounting approach of the electronic parts concerning this invention, and the attachment process of an anisotropy electric conduction film.

[Drawing 3 B] It is process drawing showing the separator exfoliation process which is the gestalt of 1 implementation of the mounting approach of the electronic parts concerning this invention.

[Drawing 3 C] It is process drawing showing the semiconductor chip mounting process which is the gestalt of 1 implementation of the mounting approach of the electronic parts concerning this invention.

[Drawing 4] It is drawing showing other modifications replaced with the elastic body roller shown in drawing 1 and drawing 2 .

[Description of Notations]

1 [-- Auxiliary roller,] -- An elastic body roller, 1A -- The roll heart, 1B -- An elastic body layer, 2 3 [-- Circuit board,] -- Adhesive tape, 4 -- A separator, 5 -- An anisotropy electric conduction film, 6 7 [-- Recovery device,] -- Package components, 8 -- A chip, 9 -- A feeder style, 10 11a, 11b, 11c [-- A semiconductor chip 20 / -- A ball-like member, 21 / -- A sheet metal-like member, 22 / -- A slot 23 / -- A pressure grant means, T1 / -- The thickness of elastic body layer 1B, T2 / -- Height of mounting components.] -- A stage, 12 -- Solder, 13 -- A bonding tool, 14

[Translation done.]

(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11) 特許出願公開番号

特開2000-101220

(P2000-101220A)

(43) 公開日 平成12年4月7日 (2000.4.7)

(51) Int.Cl.⁷

H 0 5 K 3/32
13/04

識別記号

F I

H 0 5 K 3/32
13/04

テマコード (参考)

B 5 E 3 1 3
Z 5 E 3 1 9

審査請求 未請求 請求項の数 5 O L (全 8 頁)

(21) 出願番号

特願平10-268453

(22) 出願日

平成10年9月22日 (1998.9.22)

(71) 出願人 000005108

株式会社日立製作所

東京都千代田区神田駿河台四丁目6番地

(72) 発明者 浅田 豊樹

神奈川県横浜市戸塚区吉田町292番地 株
式会社日立製作所生産技術研究所内

(72) 発明者 藤田 祐治

神奈川県横浜市戸塚区吉田町292番地 株
式会社日立製作所生産技術研究所内

(74) 代理人 100061893

弁理士 高橋 明夫 (外1名)

最終頁に続く

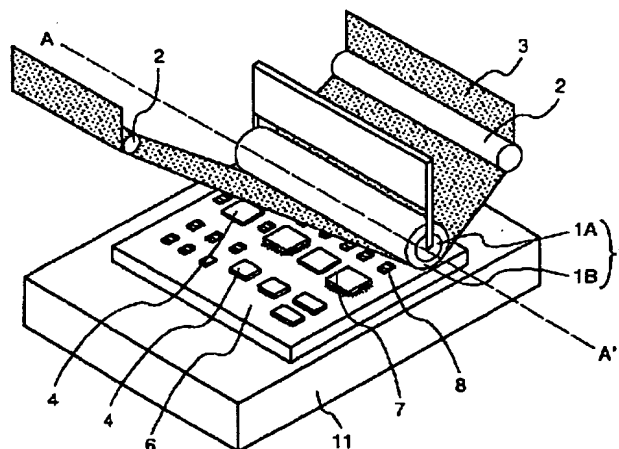
(54) 【発明の名称】 電子部品の実装方法およびそのシステム

(57) 【要約】 (修正有)

【課題】 回路基板に対して、異方性導電フィルムを用いてフリップチップ接続される電子部品の実装方法およびそのシステムを提供する。

【解決手段】 回路基板6上に、パッケージ部品7やチップ部品8等の電子部品をはんだ付け実装するはんだ付け実装工程と、回路基板上の所望の位置にセパレータ4有する異方性導電フィルムを加圧して貼付けする異方性導電フィルム貼付工程と、変形若しくは変位可能な部材1で粘着テープ3を押さえながら該部材と前記回路基板とを相対的に移動させて前記貼付けされた異方性導電フィルムのセパレータを前記粘着テープに転写して剥離するセパレータ剥離工程と、前記セパレータが剥離された異方性導電フィルム上に半導体チップを加圧して加熱することにより異方性導電フィルムを硬化させて半導体チップをフリップチップ接続実装するフリップチップ接続実装工程とを有することを特徴とする電子部品の実装方法である。

図 1



(2)

1

【特許請求の範囲】

【請求項1】回路基板上に、パッケージ部品やチップ部品等の電子部品をはんだ付け実装するはんだ付け実装工程と、

該はんだ付け実装工程で電子部品をはんだ付けした回路基板上の所望の位置にセパレータ有する異方性導電フィルムを加圧して貼付けする異方性導電フィルム貼付工程と、

変形若しくは変位可能な部材で粘着テープを押さえながら該部材と前記回路基板とを相対的に移動させて前記異方性導電フィルム貼付工程で貼付けされた異方性導電フィルムのセパレータを前記粘着テープに転写して剥離するセパレータ剥離工程と、

前記異方性導電フィルム貼付工程で貼付けられ、前記セパレータ剥離工程でセパレータが剥離された異方性導電フィルム上に半導体チップを加圧して加熱することにより異方性導電フィルムを硬化させて半導体チップをフリップチップ接続実装するフリップチップ接続実装工程とを有することを特徴とする電子部品の実装方法。

【請求項2】回路基板上に、パッケージ部品やチップ部品等の電子部品をはんだ付け実装するはんだ付け実装工程と、

該はんだ付け実装工程で電子部品をはんだ付けした回路基板上の所望の位置にセパレータ有する異方性導電フィルムを加圧して貼付けする異方性導電フィルム貼付工程と、

前記はんだ付け実装工程ではんだ付け実装された電子部品のほぼ高さ以上変形若しくは変位可能な部材で粘着テープを押さえながら該部材と前記回路基板とを相対的に移動させて前記異方性導電フィルム貼付工程で貼付けされた異方性導電フィルムのセパレータを前記粘着テープに転写して剥離するセパレータ剥離工程と、

前記異方性導電フィルム貼付工程で貼付けられ、前記セパレータ剥離工程でセパレータが剥離された異方性導電フィルム上に半導体チップを加圧して加熱することにより異方性導電フィルムを硬化させて半導体チップをフリップチップ接続実装するフリップチップ接続実装工程とを有することを特徴とする電子部品の実装方法。

【請求項3】回路基板上に、パッケージ部品やチップ部品等の電子部品をはんだ付け実装するはんだ付け実装工程と、

該はんだ付け実装工程で電子部品をはんだ付けした回路基板上の所望の位置にセパレータ有する異方性導電フィルムを加圧して貼付けする異方性導電フィルム貼付工程と、

前記はんだ付け実装工程ではんだ付け実装された電子部品のほぼ高さ以上変形可能な弾性体ローラで粘着テープを押さえながら該弾性体ローラと前記回路基板とを相対的に移動させて前記異方性導電フィルム貼付工程で貼付けされた異方性導電フィルムのセパレータを前記粘着テ

2

ープに転写して剥離するセパレータ剥離工程と、

前記異方性導電フィルム貼付工程で貼付けられ、前記セパレータ剥離工程でセパレータが剥離された異方性導電フィルム上に半導体チップを加圧して加熱することにより異方性導電フィルムを硬化させて半導体チップをフリップチップ接続実装するフリップチップ接続実装工程とを有することを特徴とする電子部品の実装方法。

【請求項4】回路基板上に、パッケージ部品やチップ部品等の電子部品をはんだ付け実装するはんだ付け実装工程と、

該はんだ付け実装工程で電子部品をはんだ付けした回路基板上の所望の位置にセパレータ有する異方性導電フィルムを加圧して貼付けする異方性導電フィルム貼付工程と、

前記はんだ付け実装工程ではんだ付け実装された電子部品のほぼ高さ以上厚い弾性体層を硬質ロール芯の外周に設けた弾性体ローラで粘着テープを押さえながら該弾性体ローラと前記回路基板とを相対的に移動させて前記異方性導電フィルム貼付工程で貼付けされた異方性導電フィルムのセパレータを前記粘着テープに転写して剥離するセパレータ剥離工程と、

前記異方性導電フィルム貼付工程で貼付けられ、前記セパレータ剥離工程でセパレータが剥離された異方性導電フィルム上に半導体チップを加圧して加熱することにより異方性導電フィルムを硬化させて半導体チップをフリップチップ接続実装するフリップチップ接続実装工程とを有することを特徴とする電子部品の実装方法。

【請求項5】回路基板上に、パッケージ部品やチップ部品等の電子部品をはんだ付け実装するはんだ付け実装手段と、

該はんだ付け実装手段で電子部品をはんだ付けした回路基板上の所望の位置にセパレータ有する異方性導電フィルムを加圧して貼付けする異方性導電フィルム貼付手段と、

変形若しくは変位可能な部材で粘着テープを押さえながら該部材と前記回路基板とを相対的に移動させて前記異方性導電フィルム貼付手段で貼付された異方性導電フィルムのセパレータを前記粘着テープに転写して剥離するセパレータ剥離手段と、

前記異方性導電フィルム貼付手段で貼付けられ、前記セパレータ剥離手段でセパレータが剥離された異方性導電フィルム上に半導体チップを加圧して加熱することにより異方性導電フィルムを硬化させて半導体チップをフリップチップ接続実装するフリップチップ接続実装手段とを備えたことを特徴とする電子部品の実装システム。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、回路基板に対して、異方性導電フィルムを用いてフリップチップ接続されるマイコン、CPU、ASIC (Application Specif

(3)

3

ic Integrated Circuit: 特定用途向けIC)、チップセット等の半導体チップの外、該半導体チップの周辺に、DC-DCコンバータ、スイッチレギュレータ、SRAM等のRAM、ROM等のパッケージ部品や抵抗やコンデンサ等のチップ部品を高密度に実装した実装構造体を製造するための電子部品の実装方法およびそのシステムに関する。

【0002】

【従来の技術】従来、異方性導電フィルムは液晶ディスプレイなどの半導体チップの接続方法として、半導体チップをガラス基板に直接フェースダウンで電氣的に接続するフリップチップ接続方法に用いられている。一般的にこのフリップチップ接続方法は、まず、半導体チップを搭載するガラス基板の位置に予め異方性導電フィルムを仮圧着し、前記異方性導電フィルム上に半導体チップを搭載、加圧、加熱し、半導体チップとガラス基板を電氣的に接続させるものである。このように、異方性導電フィルムは、セパレータと呼ばれる層間紙で異方性導電フィルムの接着面の保護を行っており、半導体チップの接続時は、前記セパレータを異方性導電フィルムから剥がす工程が必要である。その一例として例えば、特開平06-243726号公報に開示されている方法がある。通常、液晶ディスプレイのガラス基板上は、同サイズの半導体チップのみを実装するため、上記セパレータ剥離装置はほぼ同サイズのセパレータを剥がす機構である。また、ガラス基板上の実装部品はほぼ同サイズの半導体チップだけであり、チップ部品やパッケージ部品などが実装されないものであった。

【0003】

【発明が解決しようとする課題】一方、携帯電話やパソコンやデジタルカメラなどの小形の製品を製造するためには、回路基板に対して、異方性導電フィルムを用いてフリップチップ接続されるマイコン、CPU、ASIC (Application Specific Integrated Circuit: 特定用途向けIC)、チップセット等の半導体チップの外、該半導体チップの周辺に、DC-DCコンバータ、スイッチレギュレータ、SRAM等のRAM、ROM等のパッケージ部品や抵抗やコンデンサ等のチップ部品を高密度に実装した実装構造体を製造する必要がある。このように、回路基板に対して、異方性導電フィルムを用いてフリップチップ接続される半導体チップの外、該半導体チップの周辺に、パッケージ部品や抵抗やチップ部品を高密度に実装した実装構造体を製造する際、先に回路基板に対してパッケージ部品やチップ部品などをはんだ付け実装する必要がある。しかしながら、従来技術においては、先に回路基板に対してパッケージ部品やチップ部品などをはんだ付け実装したものに対して、半導体チップを上記パッケージ部品やチップ部品の周辺に高密度に異方性導電フィルムを用いてフリップチップ接続実装する点について十分考慮されていなかった。

4

【0004】本発明の目的は、上記課題を解決すべく、回路基板に対して、異方性導電フィルムを用いてフリップチップ接続されるマイコン、CPU、ASIC、チップセット等の半導体チップの外、該半導体チップの周辺に、DC-DCコンバータ、スイッチレギュレータ、SRAM等のRAM、ROM等のパッケージ部品や抵抗やコンデンサ等のチップ部品を高密度に実装した実装構造体を生産効率よく製造することができるようにした電子部品の実装方法およびそのシステムを提供することにある。

【0005】

【課題を解決するための手段】上記目的を達成するために、本発明は、回路基板上に、パッケージ部品やチップ部品等の電子部品をはんだ付け実装するはんだ付け実装工程と、該はんだ付け実装工程で電子部品をはんだ付けした回路基板上の所望の位置にセパレータ有する異方性導電フィルムを加圧して貼付けする異方性導電フィルム貼付工程と、変形若しくは変位可能な部材で粘着テープを押さえながら該部材と前記回路基板とを相対的に移動させて前記異方性導電フィルム貼付工程で貼付けされた異方性導電フィルムのセパレータを前記粘着テープに転写して剥離するセパレータ剥離工程と、前記異方性導電フィルム貼付工程で貼付けられ、前記セパレータ剥離工程でセパレータが剥離された異方性導電フィルム上に半導体チップを加圧して加熱することにより異方性導電フィルムを硬化させて半導体チップをフリップチップ接続実装するフリップチップ接続実装工程とを有することを特徴とする電子部品の実装方法である。また、本発明は、回路基板上に、パッケージ部品やチップ部品等の電子部品をはんだ付け実装するはんだ付け実装工程と、該はんだ付け実装工程で電子部品をはんだ付けした回路基板上の所望の位置にセパレータ有する異方性導電フィルムを加圧して貼付けする異方性導電フィルム貼付工程と、前記はんだ付け実装工程ではんだ付け実装された電子部品のほぼ高さ以上変形若しくは変位可能な部材で粘着テープを押さえながら該部材と前記回路基板とを相対的に移動させて前記異方性導電フィルム貼付工程で貼付けされた異方性導電フィルムのセパレータを前記粘着テープに転写して剥離するセパレータ剥離工程と、前記異方性導電フィルム貼付工程で貼付けられ、前記セパレータ剥離工程でセパレータが剥離された異方性導電フィルム上に半導体チップを加圧して加熱することにより異方性導電フィルムを硬化させて半導体チップをフリップチップ接続実装するフリップチップ接続実装工程とを有することを特徴とする電子部品の実装方法である。

【0006】また、本発明は、回路基板上に、パッケージ部品やチップ部品等の電子部品をはんだ付け実装するはんだ付け実装工程と、該はんだ付け実装工程で電子部品をはんだ付けした回路基板上の所望の位置にセパレータ有する異方性導電フィルムを加圧して貼付けする異方

(4)

5

性導電フィルム貼付工程と、前記はんだ付け実装工程ではんだ付け実装された電子部品のほぼ高さ以上変形可能な弾性体ローラで粘着テープを押さえながら該弾性体ローラと前記回路基板とを相対的に移動させて前記異方性導電フィルム貼付工程で貼付けされた異方性導電フィルムのセパレータを前記粘着テープに転写して剥離するセパレータ剥離工程と、前記異方性導電フィルム貼付工程で貼付けられ、前記セパレータ剥離工程でセパレータが剥離された異方性導電フィルム上に半導体チップを加圧して加熱することにより異方性導電フィルムを硬化させて半導体チップをフリップチップ接続実装するフリップチップ接続実装工程とを有することを特徴とする電子部品の実装方法である。また、本発明は、回路基板上に、パッケージ部品やチップ部品等の電子部品をはんだ付け実装するはんだ付け実装工程と、該はんだ付け実装工程で電子部品をはんだ付けした回路基板上の所望の位置にセパレータ有する異方性導電フィルムを加圧して貼付けする異方性導電フィルム貼付工程と、前記はんだ付け実装工程ではんだ付け実装された電子部品のほぼ高さ以上厚い弾性体層を硬質ロール芯の外周に設けた弾性体ローラで粘着テープを押さえながら該弾性体ローラと前記回路基板とを相対的に移動させて前記異方性導電フィルム貼付工程で貼付けされた異方性導電フィルムのセパレータを前記粘着テープに転写して剥離するセパレータ剥離工程と、前記異方性導電フィルム貼付工程で貼付けられ、前記セパレータ剥離工程でセパレータが剥離された異方性導電フィルム上に半導体チップを加圧して加熱することにより異方性導電フィルムを硬化させて半導体チップをフリップチップ接続実装するフリップチップ接続実装工程とを有することを特徴とする電子部品の実装方法である。

【0007】また、本発明は、回路基板上に、パッケージ部品やチップ部品等の電子部品をはんだ付け実装するはんだ付け実装手段と、該はんだ付け実装手段で電子部品をはんだ付けした回路基板上の所望の位置にセパレータ有する異方性導電フィルムを加圧して貼付けする異方性導電フィルム貼付手段と、変形若しくは変位可能な部材で粘着テープを押さえながら該部材と前記回路基板とを相対的に移動させて前記異方性導電フィルム貼付手段で貼付された異方性導電フィルムのセパレータを前記粘着テープに転写して剥離するセパレータ剥離手段と、前記異方性導電フィルム貼付手段で貼付けられ、前記セパレータ剥離手段でセパレータが剥離された異方性導電フィルム上に半導体チップを加圧して加熱することにより異方性導電フィルムを硬化させて半導体チップをフリップチップ接続実装するフリップチップ接続実装手段とを備えたことを特徴とする電子部品の実装システムである。

【0008】以上説明したように、前記構成によれば、回路基板に対して、異方性導電フィルムを用いてフリッ

6

プチップ接続されるマイコン、CPU、ASIC (Application Specific Integrated Circuit: 特定用途向けIC)、チップセット等の半導体チップの外、該半導体チップの周辺に、DC-DCコンバータ、スイッチレギュレータ、SRAM等のRAM、ROM等のパッケージ部品や抵抗やコンデンサ等のチップ部品を高密度に実装した実装構造体を生産効率よく製造することができ、その結果、携帯電話や携帯端末やパソコンやデジタルカメラ等の小形の製品を安価に製造することができる。

【0009】

【発明の実施の形態】本発明に係る半導体チップ、パッケージ部品、およびチップ部品等の電子部品を回路基板に実装する方法の実施の形態について、図面を用いて説明する。本発明は、パッケージ部品7やチップ部品8を回路基板6上にはんだ付け実装し、半導体チップ14を回路基板6上にフリップチップ接続して直接実装することで高密度実装することで、回路基板6サイズを小さくして、携帯電話やパソコンやデジタルカメラ等の製品の小形化を実現するものである。即ち、本発明においては、携帯電話やパソコンやデジタルカメラ等の製品の場

合、小形化を実現するために、回路基板6上に、マイコン、CPU、ASIC (Application Specific Integrated Circuit: 特定用途向けIC)、チップセット等の半導体チップ14の外、半導体チップ14の周辺に、DC-DCコンバータ、スイッチレギュレータ、SRAM等のRAM、ROM等のパッケージ部品7や抵抗やコンデンサ等のチップ部品8を実装した高密度実装構造体を製造する必要がある。

【0010】次に、このような高密度実装構造体を製造するための、半導体チップ14、パッケージ部品7、およびチップ部品8等を回路基板6に高密度実装する方法について、図3A、図3B、および図3Cを用いて説明する。まず、図3Aに、ステップ1で示すように、ステージ11a上に載置され、パッケージ部品7やチップ部品8の端子またはリードが実装される回路基板6上の所望の箇所(電極)にはんだ12を供給する。このはんだ12の供給方法としては、例えばはんだ印刷方式を用いる。次に、ステップ2で示すように、パッケージ部品7やチップ部品8の端子またはリードを回路基板6上に搭載する。次に、ステップ3で示すように、前記回路基板6に対してリフロー等で熱を加えてはんだ12を溶融させてリフローソルダーリングを施すことによって、パッケージ部品7やチップ部品8の端子またはリードを回路基板6に形成された回路配線と接続する。

【0011】次に、半導体チップ14を回路基板6上に実装するフリップチップ接続を行う。以上説明したように、高密度実装構造体を製造するために、パッケージ部品7やチップ部品8を回路基板6に接続実装後、半導体チップ14を回路基板6にフリップチップ接続実装するようにした。仮りに、回路基板6に対してパッケージ

10

20

30

40

50

(5)

7

部品7やチップ部品8を接続実装する前に、半導体チップ14をフリップチップ接続実装しようとする、回路基板6上に半導体チップ14が搭載されているため、はんだ12供給時のはんだ12印刷が難しく、また、特に半導体チップ14の周辺に対するはんだ12印刷が困難となり、半導体チップ14の周辺に密接させた高密度実装が困難となる。そこで、前述したように、先に、パッケージ部品7やチップ部品8を回路基板6に接続実装し、その後、半導体チップ14を回路基板6にフリップチップ接続実装するようにした。

【0012】以下、上記フリップチップ接続について、詳述する。まず、先に、パッケージ部品7やチップ部品8を回路基板6に接続実装した状態で、図3Aに、ステップ4で示すように、半導体チップ14を実装する回路基板6上に、半導体チップ14の形状に相応した形状に切断された異方性導電フィルム5をボンディングツール13を用いて貼付ける。即ち、半導体チップ14の形状に相応した形状に切断された異方性導電フィルム5をボンディングツール13に保持し、この異方性導電フィルム5を保持したボンディングツール13を、ステージ11上に載置された半導体チップ14を実装する回路基板6上の所望の位置に搬送して持ち来し、異方性導電フィルム5を回路基板6上の所望の位置に押し付けることによって異方性導電フィルム5が貼付けられることになる。ところで、ステージ11a上に載置された回路基板6上において、半導体チップ14を実装する箇所の異方性導電フィルム5上には、異方性導電フィルム5を貼付ける時に異方性導電フィルム5とボンディングツール13との接着を防ぐために、セパレータ4を有することになる。次に、パッケージ部品7やチップ部品8を回路基板6に接続実装した状態で、図3Bに、ステップ5、6、7で示すように、回路基板6上に複数貼付けられた異方性導電フィルム5上からセパレータ4を一度に効率的に剥がし、これらセパレータ4が剥がされた各々の異方性導電フィルム5上に半導体チップ14をフリップチップ接続を用いて搭載する。

【0013】図1に本発明に係るセパレータ剥離装置の一実施例の斜視図を示す。図2はA-A'断面図である。図1、図2において、1は弾性体ローラ、1Aはロール芯、1Bは弾性体層、2は補助ローラ、3は粘着テープ、4はセパレータ、5は異方性導電フィルム、6は回路基板、7はパッケージ部品、8はチップ部品、11bはステージである。以下、図1、図2を用いて本発明に係るセパレータ剥離装置の構造を説明し、次いで図3Bを用いてセパレータ4の剥離方法を説明する。本発明に係るセパレータ剥離装置は、長尺の弾性体ローラ1とその左右にある長尺の補助ローラ2を有し、弾性体ローラ1と補助ローラ2の直下に粘着テープ3を備え、パッケージ部品7やチップ部品8を回路基板6に接続実装した状態で、長尺の弾性体ローラ1を下降させることで粘

8

着テープ3を回路基板6に押し当てることのできる機構を持つ。長尺の弾性体ローラ1はロール芯1Aに硬質の材料を用い、そのロール芯1Aの外周に弾性体層1Bを形成する。弾性体ローラ1のロール芯1Aの硬質の材質には、プラスチック、アルミ、ステンレスが好ましい。また、弾性体ローラ1のロール芯1Aの外周に形成する弾性体層1Bには、ゴム、スポンジなどのクッション材が好ましい。また、弾性体ローラ1のロール芯1Aに必ずしも硬質の材質に限定せず、弾性体の材質を用いてもよい。但し、先に、パッケージ部品7やチップ部品8を回路基板6に実装接続し、長尺の弾性体ローラ1とステージ11bに載置された回路基板6とを相対的に走行（移動）させるだけでパッケージ部品7の周辺に近接して貼付けられた複数の異方性導電フィルム5上からセパレータ4を剥がす関係で、図2に示すように、弾性体層の厚さT1は、パッケージ部品7やチップ部品8などの実装部品の高さT2より厚くする（ $T1 > T2$ ）必要がある。

【0014】なお、以上の説明では、パッケージ部品7の周辺に近接して貼付けられた複数の異方性導電フィルム5上からセパレータ4を剥がすために、弾性体層1Bが変形し得る長尺の弾性体ローラ1で構成した場合について説明したが、その他、図4に示すように、例えばボール状の部材20を溝22内に一列状に並べ、これら一列状のボール部材20に対して大きく撓む薄板状部材21を当て、この薄板状部材21に対してばねや気体もしくは液体等の圧力付与手段23で圧力を付与するように構成したものでも使用することが可能となる。即ち、パッケージ部品7やチップ部品8などの実装部品の高さT2に倣ってボール状部材20が大きく変位することができればよい。回路基板6上は、図1、図2、および図3Bに示すように、予め実装されたパッケージ部品7やチップ部品8などの実装部品と、仮圧着された異方性導電フィルム5とが密接して混載しているため、回路基板6の上面において実装部品の高さT2の部品高低差が生じていることになる。

【0015】本発明に係るセパレータ剥離装置は、弾性体ローラ1を上記回路基板6に押し当てた際、図2に示すように、弾性体ローラ1の弾性体層1Bが実装部品の高さT2に倣って変形し、弾性体ローラ1の弾性体層1Bが回路基板6上にならうことになる。弾性体ローラ1の直下に予め備えられていた粘着テープ3は、弾性体ローラ1が回路基板6上面と接触することで、粘着テープ3も回路基板6の上面と接触することになる。そこで、弾性体ローラ1で回路基板6上面に押し当てられた粘着テープ3が、実装部品の高さT2より薄い異方性導電フィルム5にも接触し、異方性導電フィルム5の表面に有するセパレータ4を粘着テープ3に転写することができ。ところで、図3Bに示すように、セパレータ剥離装置には、粘着テープ3をリール形状で供給できる機構9

(6)

9

と、更にセパレータ4が転写された粘着テープ3もリール形状に回収する機構10とを備え付けている。従って、粘着テープ3は、供給機構9から補助ローラ2を経由して弾性体ローラ1が位置する箇所に供給され、該箇所でセパレータ4を転写した粘着テープ3は、補助ローラ2を経由して回収機構10で回収されることになる。

【0016】ところで、粘着テープ3の幅は、回路基板6のサイズに合わせるのが好ましいが、必ずしも回路基板6のサイズに合わせる必要はない。要するに、粘着テープ3の幅を回路基板6のサイズより狭くしても、弾性体ローラ1によって粘着テープ3が、回路基板6上に貼付けられた複数の異方性導電フィルム5上を狙って、該複数の異方性導電フィルム5に押し当てられればよい。次に、図3Bを用いて、本発明に係るセパレータ4の剥離方法の手順を説明する。9は、粘着テープ供給リール等から構成された供給機構、10は、粘着テープ巻き取りリール等から構成された回収機構である。まず、パッケージ部品7とチップ部品8が予め実装され、更に表面にセパレータ4を有する複数の異方性導電フィルム5が仮圧着された回路基板6を、ステージ11b上に載置して、弾性体ローラ1の下側に搬送し、供給機構9と回収機構10とを回転駆動させて粘着テープ3を弾性体ローラ1と補助ローラ2の直下に送り出す(ステップ5)。

【0017】次に、粘着テープ3を押さえながら弾性体ローラ1を下降させて、粘着テープ3と回路基板6の始端部を接触させ、一定の力で回路基板6を押しつつ粘着テープ3の長手方向にステージ11bを動かし回路基板6を移動(走行)させ、回路基板6の移動と同時に供給機構9と回収機構10とによる弾性体ローラ1の直下における粘着テープの移動速度が回路基板6の移動速度と同じ速度になるように制御する(ステップ6)。その結果、長尺の弾性体ローラ1の弾性体層1Bが実装部品7、8、5の高さT2に倣って変形することにより、回路基板6上の複数箇所にある異方性導電フィルム5のセパレータ4が、粘着テープ3の粘着力が仮圧着した異方性導電フィルム5の接着力より大きいために異方性導電フィルム5から剥がされて粘着テープ3に全て転写されることになる(ステップ7)。以上説明したセパレータ剥離工程(ステップ5、6、7)によれば、弾性体層1Bが実装部品7、8、5の高さT2に倣って変形する長尺の弾性体ローラ1と粘着テープ3とを用いて、異方性導電フィルム5の周辺にパッケージ部品7やチップ部品8が密接して実装された回路基板6に対して相対的に移動(走行)させることにより、半導体チップ14のフリップチップ接続の一工程である異方性導電フィルム5のセパレータ4の剥離を短時間で多数剥がすことで、セパレータ剥離工程時間を大幅に短縮し、フリップチップ接続の生産効率を向上させることができる。

【0018】次に、セパレータ4が剥がされた複数の異

10

方性導電フィルムを有する回路基板6は、図3Cに示すように、半導体チップ14を搭載する装置におけるステージ11c上に搬送される。次に、ボンディングツール13で各半導体チップ14を各異方性導電フィルム5上から押しあて、各半導体チップ14を加圧し、加熱し、異方性導電フィルム5を硬化させ、回路基板6と各半導体チップ14とを接続実装させる(ステップ8)。以上説明したように、回路基板6に対して、異方性導電フィルム5を用いてフリップチップ接続される半導体チップ14と、該半導体チップ14の周辺にパッケージ部品7やチップ部品8とを高密度に実装した実装構造体を効率よく製造することができる(ステップ9)。

【0019】

【発明の効果】本発明によれば、回路基板に対して、異方性導電フィルムを用いてフリップチップ接続されるマイコン、CPU、ASIC(Application Specific Integrated Circuit: 特定用途向けIC)、チップセット等の半導体チップの外、該半導体チップの周辺に、DC-DCコンバータ、スイッチレギュレータ、SRAM等のRAM、ROM等のパッケージ部品や抵抗やコンデンサ等のチップ部品を高密度に実装した実装構造体を生産効率よく製造することができ、その結果、携帯電話や携帯端末やパソコンやデジタルカメラ等の小形の製品を安価に製造することができる効果を奏する。

【図面の簡単な説明】

【図1】本発明に係るセパレータ剥離装置の一実施例を示す斜視図である。

【図2】図1のA-A'矢視断面図である。

【図3A】本発明に係る電子部品の実装方法の一実施の形態であるパッケージ部品やチップ部品の実装工程および異方性導電フィルムの貼付け工程を示す工程図である。

【図3B】本発明に係る電子部品の実装方法の一実施の形態であるセパレータ剥離工程を示す工程図である。

【図3C】本発明に係る電子部品の実装方法の一実施の形態である半導体チップ実装工程を示す工程図である。

【図4】図1および図2に示す弾性体ローラに代わる他の変形例を示す図である。

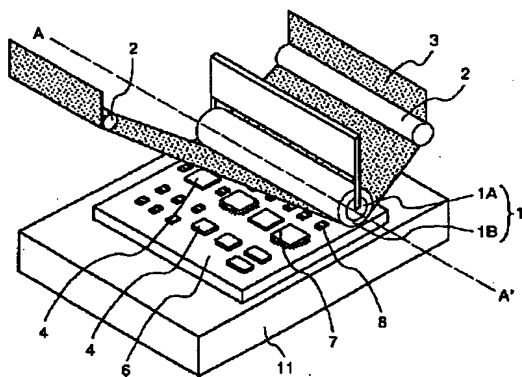
【符号の説明】

1…弾性体ローラ、1A…ロール芯、1B…弾性体層、2…補助ローラ、3…粘着テープ、4…セパレータ、5…異方性導電フィルム、6…回路基板、7…パッケージ部品、8…チップ部品、9…供給機構、10…回収機構、11a、11b、11c…ステージ、12…はんだ、13…ボンディングツール、14…半導体チップ、20…ボール状部材、21…薄板状部材、22…溝、23…圧力付与手段、T1…弾性体層1Bの厚さ、T2…実装部品の高さ。

(7)

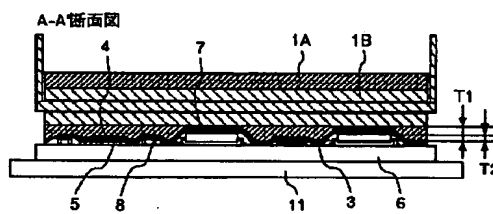
【図1】

図 1



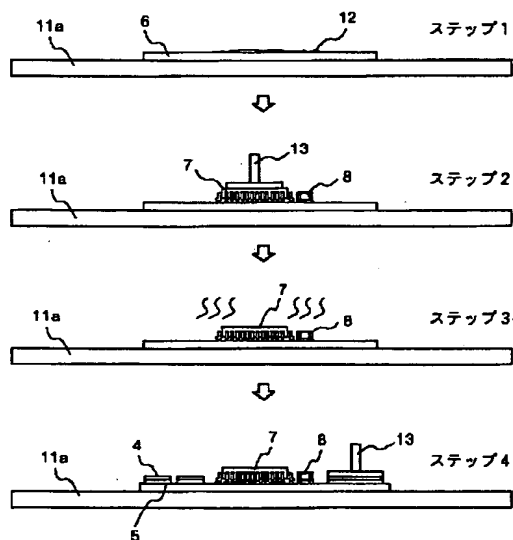
【図2】

図 2



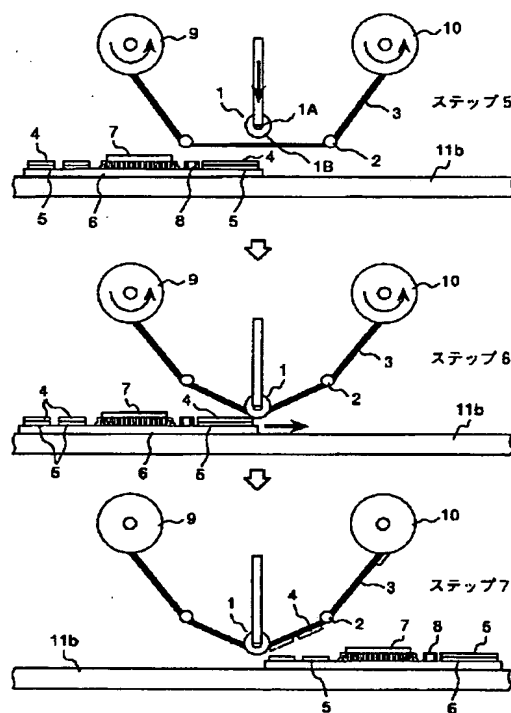
【図3A】

図 3 A



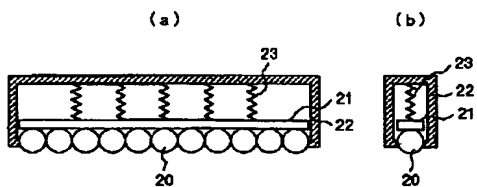
【図3B】

図 3 B



【図4】

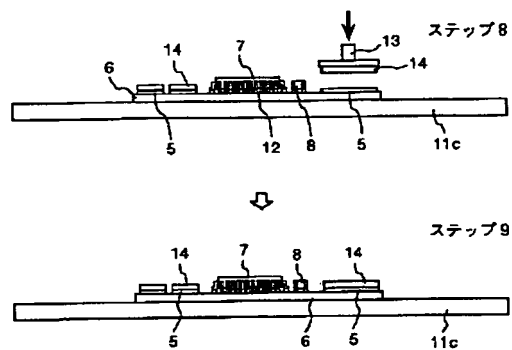
図 4



(8)

【図3C】

図 3 C



フロントページの続き

(72) 発明者 植田 希絵
 神奈川県横浜市戸塚区吉田町292番地 株
 式会社日立製作所生産技術研究所内
 (72) 発明者 天野 泰雄
 神奈川県横浜市戸塚区吉田町292番地 株
 式会社日立製作所生産技術研究所内

(72) 発明者 八矢 登志広
 茨城県ひたちなか市稲田1410番地 株式会
 社日立製作所映像情報メディア事業部内
 Fターム(参考) 5E313 AA03 AA04 CC05 EE22 FG05
 FG10
 5E319 AA03 AB01 AB06 BB16 CC22
 CC61 CD26 GG01